alternative embodiments thereof. Thus, aspects of the present invention provide a smart home environment that can allow users to more easily customize, scale, and reconfigure their homes in a more effortless and user friendly manner.

[0052] Some particular embodiments may include a modular host system with a host unit installed in a support structure (e.g., wall, ceiling, floor, etc.) of a building that can receive and house a modular accessory. The modular accessory can be, e.g., a control switch (e.g., bistable switch, thermostat, etc.), power outlet, sensor module (e.g., image sensor, audio sensor, force sensor, etc.), or the like. The host unit may include a power gating module that can couple and decouple electrical power (e.g., AC or DC power) from an electrical source (e.g., utility grid, renewable energy resource, etc.) to the modular accessory, and a communication module that can communicate via hardwired (e.g., Ethernet, fiber optics, coaxial cable) or wireless communication (e.g., via ultra-wide band (UWB), radar, RF, etc.) with one or more additional host units installed in the building. In some embodiments, the communication module may perform a gating function to couple and decouple a physical network connection from a network source (e.g., Ethernet, fiber optics, coaxial) to the host unit. Distance data corresponding to a distance between the host unit and each of the one or more additional host units can be gleaned from said wired or wireless communication. In some implementations, the system can then automatically determine a floor plan of the building based at least on the determined distances from the host unit to the one or more additional host units. In some cases, each host unit can include a self-orientation module that can determine an orientation of the host unit in three-dimensional (3D) space and, in some cases, an orientation relative to the support structure it is installed in. The floor plan can further be based on orientation data from the orientation module. The orientation module can include an inertial motion unit (IMU), accelerometer, magnetometer, barometer, altimeter, one or more antennas, or the like, as further described below. Alternatively or additionally, some host units may be configured to track the relative position and orientation of a portable device (e.g., tablet computer, smart phone or wearable, laptop computer, etc.) that has a compatible communication module. Certain embodiments may employ an authentication module for additional security, as further described below with respect to FIG. **6**. The modular host system can be of any suitable form factor, however particular embodiments may be operable to be retrofitted into a space configured to receive a conventional standard wall outlet, as described below with respect to FIG. **1**. To provide some non-limiting implementations, the host unit can be configured to fit into a new/different space in a support structure (e.g., wall), the host unit can be a **1**:**1** physical substitute for the an outlet box (see, e.g., FIG. **1**, element **130**) as noted above, or the host unit can fit completely inside an existing outlet box, such that no complete removal of existing infrastructure may be needed, among other possible implementations. One of ordinary skill in the art with the benefit of this disclosure would understand the many variations, modifications, and alternative embodiments thereof.

[0053] Furthering the general overview, some implementations of the modular multi-host system may be configured detect the presence of an object in the building using the distance measurements between host units, determine a vector of the detected object, differentiate between multiple users by various biometrics and body mechanics, establish a confidence level that the detected object (user) is authenticated, and establish a hierarchy of privileges for the user based on the level of authentication.

[0054] As described above, host units may communicate with other additional host units to determine a distance between them as well as each of their orientations to determine a floor plan. This can be done a single time (e.g., after initial installation) using the time-of-flight (TOF) of the communications signals (e.g., UWB) to determine the corresponding distances. However, when TOF is measured multiple times (e.g., periodically (e.g., 1 s intervals), aperiodically, continuously, intermittently, etc.), variations in the distance measurements may indicate the presence of an object in the room. When an object obstructs a particular line-of-sight measurement between host units, the communication signal (e.g., UWB) may pass through the object, which can change the TOF measurement. In addition, the communication signal may be observed to take an alternative path if the shortest direct path is blocked; this will also change the TOF measurement. For instance, if a distance between two host units is measured to be 2.5 m via TOF calculations and a sofa is subsequently placed between the two host units, obstructing the line-of-sight between them, the measured distance may change as the UWB signals may pass through the sofa at a slightly slower rate than in open air or because the received UWB signals traveled an alternate path. Changes may be on the order of millimeters or centimeters, depending on the type of obstruction and the geometry of the surrounding area. For the purposes of simplifying explanation, the line-of-sight communications between host units may be thought of as operating like virtual "trip wires" that "trigger" when an objects passes between them and changes their corresponding TOF measurement. To provide context, animate objects (e.g., humans, animals) may be expected to have a typical static distortion of approximately 4-25 cm. Non-conductive objects may be 1-4 cm. Some large conductive bodies (e.g., televisions) may obstruct the line-of-sight path entirely, consequently resulting in a measuring of a shortest reflection path (e.g., off of one or more walls or other reflective objects), which can be relatively small (e.g., 2-5 cm) or relatively large (e.g., one or more meters). Note that these examples are not limiting and smaller or larger values are possible depending on the type of object. Some embodiments may employ threshold triggers for object detection. For instance, some level of distortion may be expected, even when no object is obstructing the line-of-sight (LOS). To differentiate between expected system noise (i.e., EMI, natural phenomena or other interference, etc.), some minimum detected distance (e.g., 1 cm) may be used to differentiate objects from noise. In certain embodiments, phased arrays of antennas can be used at the host units and an angle-of-signal arrival can be detected, which can both be used to determine an orientation of the host unit with respect to the other host units, but also can be used to detect objects by examining an amount of distortion in the angle-of-signal arrival signal, as described herein with respect to the distance data.

[0055] In some embodiments, distance measurements may be a primary metric used for object detection. Alternatively or additionally, a second metric can be an increase in the variance of the signal. For two nodes, there may be some base variance (e.g., 1 cm^2). When an object is introduced into the path, especially a conductive object including